Media use before, during and after COVID-19 lockdown according to parents in a clinically referred sample in child and adolescent psychiatry: Results of an online survey in Switzerland

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Abstract: BACKGROUND To investigate the consequences of COVID-19 lockdown on screen media use in children and adolescents with mental health problems, an online survey was conducted on leisure media use before, during and after the lockdown of spring 2020. METHOD Parents of patients (10-18 yrs) referred to child and adolescent psychiatry participated in an anonymous online survey, approximately six weeks after the first easing of lockdown measures. Parents rated the amount, the content and the psychological impact of their children's media use before, during and after the lockdown. RESULTS N = 477 parents completed the survey. Patients showed a significant increase in media time during the lockdown (including devices such as mobile, tablet/PC, video game console, TV, and activities such as gaming, social media) and a moderate increase in the negative impact of media use on everyday life. After the lockdown, total media time returned to pre-COVID-19 levels in most patients, but remained slightly higher in males. A worsening of the main psychopathological problem during lockdown was related to elevated media time in children (10-13 yrs), but not in adolescents (14-18 yrs). CONCLUSION According to parents' retrospective ratings, the increase in screen media time was reversible, and seems to reflect an expected coping strategy during lockdown. However, male patients did not completely return to pre-COVID-19 gaming time, and a small number continued to display excessive gaming.

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ABSTRACT

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1. Introduction

The impact of the COVID-19 lockdown on children's and adolescents' well-being in general, and on the effects of increased screen media use in particular, has been raised as a major concern by the World Health Organization [1] and UNICEF [2]. Due to school closures, social distancing and reduced opportunities for stress regulation, critical effects of the lockdown on children's and adolescent's mental health have been reported [3–5] (see review by [6]). For instance, studies have reported increased irritability, boredom [7], anxiety [8], depression [9] or even self-harm and suicidal behavior [10]. While media use may represent a helpful coping strategy in the times of the COVID-19 pandemic [11] and a potential method to remain socially connected with peers [12], it can be harmful for individuals at risk for addictive behaviors or psychological distress [13,14]. Thus, experts have issued warnings to carefully monitor children's and adolescents' screen media behavior during COVID-19 lockdown in order to prevent problematic internet use (PUI) [15,16]. PUI can be conceptualized as a behavioral addiction disorder [17] involving detrimental internet-based activities [18], or more generally as a disorder related to all detrimental activities involving digital media use, such as gaming, problematic use of smartphones or social media, or cyberbullying (see [15]). While PUI has been described in both males and females (see e.g. [15]), girls are more likely to spend their smartphone time on social media activities and boys are more likely to game [19–21]. While problematic effects of the COVID-19 crisis on mental health and well-being have been described for the general population, the consequences for children and adolescents with preexisting psychopathologies may be more complex. Several studies

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have reported a worsening of symptoms during the pandemic [22–25], although a smaller subgroup of patients with psychopathologies seems to benefit from lockdown conditions and may even show an alleviation of symptoms [26–29].

In general, children and adolescents with mental health problems are at risk for PUI [30,31], and especially for internet gaming disorder [32], with the latter showing higher rates in males. Besides behavioral addiction, young people with mental health problems also seem to be more vulnerable to other problematic aspects of the internet, such as cyber-victimization, or problematic use of chatrooms or blogs such as pro-anorexia and self-harm blogs [33,34]. Cyber-victimization may be associated, for example, with depression, anxiety, and suicidal behavior, or may result from being transgender or belonging to another sexual minority [35,36]. Models on internet addiction or internet gaming disorder predict that loneliness/ social isolation and perceived social support or the lack thereof may contribute to the development of addictive internet use, especially in combination with maladaptive coping and preexistent psychopathology (see "Interaction of Person-Affect-Cognition-Execution Model" and "Cognitive-Behavioral Model of Pathological Internet Use" [37–39]). In consequence, children and adolescents with mental health problems, which often includes poor coping strategies, enhanced impulsivity and poor self-regulatory functions, may be particularly at risk for the development of PUI under lockdown conditions. Unsurprisingly, one study on internet use during COVID-19 lockdown showed a steeper increase in children and adolescents with autism spectrum disorder than in non-affected controls [40].

The main goal of the present study was to evaluate the impact of the COVID-19 lockdown on screen media behavior in a clinically referred sample of children and adolescents with psychiatric disorders. Additionally, we wanted to examine whether possible effects would resolve after the easing of measures. We hypothesized that the lockdown situation would result in an important increase of media/ internet use which would persist in a sizable portion of patients after the release of measures. The rewarding experience of stress relieve or escape from boredom induced by increased media use during the lockdown would lead to a conditioning process in a subgroup at risk for PUI, resulting in addictive or problematic internet behavior. To the best of our knowledge, this is the first study to investigate screen media use before, during and after the COVID-19 spring 2020 lockdown according to parents' retrospective ratings in a clinical sample of children and adolescents referred for mental health problems worldwide and in particular in Switzerland.

2. Material and methods

2.1. Recruitment

Parents of all patients (aged 10 to 18 years) who had been in treatment in the last two years at one of the eight outpatient clinics of the Department of Child and Adolescent Psychiatry and Psychotherapy of the University of Zurich (CAPP) were invited to participate in the present online survey. The CAPP treats patients from the whole Canton of Zurich (1.5 million residents), including socioeconomically diverse locations with rural, urban and industrial areas. Parents were contacted by email, including comprehensive information on the study. Further study information was published on the CAPP website. The survey could be completed anonymously by one parent, either the father or mother, or by both separately. The study was conducted in accordance with principles of the declaration of Helsinki and in agreement with the local Ethics committee.

2.2. Timeline of lockdown in Switzerland and data collection

In Switzerland, a complete lockdown with the closing of schools started on March 16th 2020. Treatment at the outpatient clinics continued for severely ill patients onsite or whenever possible via telepsychiatry. Most schools established homeschooling during the lockdown, often with virtual teaching (online teaching, or via email or telephone). After May 11th 2020, schools gradually reopened, but many students did not return to onsite class before the second week of June, often with reduced onsite hours, and in some cases not at all before the summer vacation. Data collection for the present study began on May 30th 2020 and was completed on July 4th 2020.

2.3. Instruments

Questions regarding media use were based on a paper-and-pencil screening questionnaire (PUI-Screening Questionnaire for Children and Adolescents, PUI-SQ) developed by Werling and colleagues [41] for the routine screening of problematic use of the internet/screen media and media-related problems in child and adolescent psychiatry, adapted for the purpose of the present research. The PUI-SQ comprises four subscales/domains:

- Media time concern subscale: Parents' concern about the amount of time spent on digital activities (two items: gaming, social media), with different media devices (four items: smartphone, tablet/PC, TV, game console).
- Negative impact subscale: Impact of media use on everyday life and addiction-like behaviors (seven items)
- Concern about digital risks and problems subscale: Parents' concern about problem and risk behaviors related to media use (eight items)
- Estimated media time: Amount of time per day (during leisure time) spent on different digital activities (gaming, social media use) and with different devices (mobile/smartphone, PC/tablet, game console, TV) (six items)

Concern about time spent on media was rated separately from estimated media time on different devices, as parents often feel concerned about their child's media use but without being precisely aware of their child's online activity. They may, however, more objectively observe and indicate the time spent on different devices. Media problem behaviors or concerns were rated on a 4-point Likert scale (from "not true" to "absolutely true"). Daily media time (for leisure) was rated on a 5-point scale (no time at all, <1 h, 1-3 h, 4-6 h, >6 h). Each item was rated three times: retrospectively before the COVID-19 outbreak (January 2020) and during lockdown (March/April 2020), and the current situation (last two weeks). Subscale sum scores were used for the statistical analysis of changes over time. Internal consistency for the subscales was good (Cronbach's alpha >0.8), with the exception of the media time concern subscale (Cronbach's alpha 0.3–0.4). This may be explained by the fact that in this PUI screening, parents' concerns are often limited to one or two aspects.

The present study used data from the European COVID-19vIruS Health Impact Survey 3.2 (CRISIS) (Coghill et al. unpublished), which is a European-wide survey study in child and adolescent psychiatry assessing mental health problems and well-being during the COVID-19 crisis. For this analysis, only items on basic demographic characteristics, the financial situation of the family, and (home) schooling were retrieved. In addition, we used items that asked for 1) the main problem and a possible second problem for which the child was in treatment (with the possibility to choose from preselected categories and a free text field for specification), 2) changes of the main problem during the lockdown, 3) how happy or unhappy the child had been during the lockdown, and 4) the frequency of home leaves during the lockdown.

2.4. Statistical analysis

The main results were analyzed descriptively. Comparisons of categorical data were calculated using Chi^2 tests. Interval-scaled data were analyzed using ANOVAs. Data compared across three observation times (T1: pre-COVID-19; T2: lockdown; T3: last two weeks) were analyzed

using repeated measures ANOVAs with gender (2 levels) and age groups (2 levels) as fixed within-subject factors. When assumptions of sphericity were violated for repeated measures analyses, Greenhouse-Geisser correction was reported. Despite violation of assumptions of sphericity or normal distribution, ANOVA was nevertheless used, as it is considered robust against violations, especially with large sample sizes [42]. However, when distributional conditions were not met, post hoc results were carried out non-parametrically and the alpha level for pairwise comparisons was Bonferroni-corrected. For analyses of gender effects, patients with gender identity conditions/ transgender patients were excluded due to their small number. To analyze the impact of different factors on total media time, ANOVAs were performed with total media time as dependent variable and the respective factor (three or two levels) and age groups (two levels) as fixed factors. Gender was not included as factor in these latter analyses, as exploratory analyses revealed that it had no significant impact on the respective results.

3. Results

3.1.1. Sample description

The study link was sent to approximately 1700 families via email. $N = 477$ parent ratings with complete data sets on media use and diagnostic information were collected, resulting in a response rate of 28%. Of the total responses, 53.2% referred to male patients, 41.9% to female patients, and 4.8% to transgender patients (Table 1). The patients' mean age was 13.96 years (SD = 2.29), with boys being younger than girls on average (13.55 vs. 14.22 years; $p < .001$; Table 1). Other gender/ transgender patients were older (15.83 years) than the other two groups. The majority of parents were biological mothers ($N = 361$) or fathers ($N = 105$), six were adoptive parents (father N = 3, mother N = 3), three were stepparents (father $N = 2$, mother N = 1), and one was a foster mother. For further analyses, the patients were divided into two age groups: 10 to 13 years ($N = 186$) and 14 to 18 years ($N = 291$). Male patients were overrepresented in the younger group (116:70), while the male/female ratio was well-balanced in the older group (138:130). All patients with gender identity conditions belonged to the older group (Table 1).

3.2. Main psychopathological problem according to parent assessment

Participants were asked to indicate the main problem for referral by selecting one out of eight categories, including the category "other". 85% of parents opted for one of the seven provided psychopathological categories (Table 1). The problems of the remaining 15% were specified in a free text section and could subsequently be categorized into aggressive behavior ($N = 13$), bipolar disorder ($N = 6$), borderline (N = 6), developmental crises/puberty-related problems (N = 6), school absenteeism ($N = 3$), psychotrauma ($N = 4$), learning problems/IQ evaluation (N = 4), family/social problems (N = 6), tic disorder (N = 3), excessive gaming (N = 3), transgender/gender identity conditions ($N = 23$), and no diagnosis/unknown ($N = 14$). The next item addressed a potential second important problem. The responses of the parents who indicated a second problem ($N = 241$; multiple-problem group) were categorized into attention-deficit/hyperactivity disorder (9.6%), anxiety disorder (11.9%), depression (8.6%), eating disorder (3.1%), obsessive-compulsive disorder (4.4%), learning disorder (7.5%) and other (5.2%). "Gaming" was indicated as a second problem by three participants. The remaining parents indicated no second problem (single-problem group, $N = 236$) (Table 1).

Approximately 97.5% of patients attended school regularly in January 2020, including 40 patients (8.4%) who attended vocational school as part of an apprenticeship. During the lockdown, almost half of the patients received online homeschooling daily, another 30% frequently or sometimes, and about 20% seldom or never. At the time of data collection («last two weeks»), which mainly took place during the month of June, most patients (84.9%) had returned to "onsite" school, either with regular school hours (40%) or with reduced hours (44%).

Table 1
Demographics and main psychopathologies.

	N	%	Age mean	SD	Age range	
All	477	100	13.96	2.29	10–18	
Age ≤ 13 yrs	186	39%	11.49	1.13	10–13	
Age ≥ 14 yrs	291	61%	15.54	1.19	14–18	
Male all	254	53.2%	13.55	2.34	10–18	
Male ≤13 yrs	116	24.3%	11.33	1.09	10–13	
Male ≥14 yrs	138	28.9%	15.41	1.12	14–18	
Female all	200	41.9%	14.28	2.19	10–18	
Female ≤13 yrs	70	14.7%	11.76	1.16	10–13	
Female ≥14 yrs	130	27.3%	15.64	1.17	14–18	
Other/transgender	23	4.8%	15.83	0.98	14–17	
Main psychopathological problem						
	N	%	Age mean	Age SD	range	(male/female/transgender)
ADHD	131	27.5%	13.2	2.4	10–18	97/34/0
ASD	67	14.0%	13.9	2.2	10–18	49/18/0
Depression	73	15.3%	14.9	2.0	10–18	26/73/0
Anxiety disorder	62	13.0%	13.3	2.4	10–18	24/38/0
OCD	24	5.0%	14.2	2.4	10–17	18/6/0
Eating disorder	25	5.2%	14.8	2.0	11–17	1/24/0
Gender identity conditions	23	4.8%	15.8	1.0	14–17	0/0/23
Other	72	15.0%	13.6	2.2	10–17	39/33/0
Number of pathological problems						
Single problem	236	49.5%	13.8	2.24	10–18	136/87/13
Multiple problems	241	50.5%	14.1	2.35	10–18	118/113/10
Family and situational context						
Family's financial situation	Very difficult	Some difficul-ties	Accep-table	Satisfac-tory	Very good	No response
% responses	2.5%	5.9%	11.7%	42.6%	29.6%	7.8%
Leaving home during lockdown	Once a week or less	Several times a week	Once a day	Several times a day		
% responses	37.1%	35.8%	17.2%	9.9%		

SD = standard deviation. Deviations from 100% may be due to rounding.

3.2.1. Time spent on different media devices

Parents estimated the child's media time before the COVID-19 crisis (January 2020), during the lockdown (March/April 2020) and during the last two weeks (June 2020/first week of July 2020) (Fig. 1). Time spent on media for scholastic/academic activities was explicitly excluded from leisure media time.

As expected, media time increased during the lockdown and subsequently decreased thereafter for all screen media activities and devices. The smartphone was by far the most popular digital device, used by 25% of patients for more than 4 h a day and by 18% for more than 6 h a day during lockdown (compared to 18% and 4%, respectively, before COVID-19), followed by tablet/PC (used for more than 4 h by 17% and more than 6 h by 8%). About one third of the youth never watched TV (via a TV set) according to parents' ratings, either before or during lockdown, and although there was an increase in TV time, only a small minority of patients showed excessive TV use (4% > 4 h, 1% >6 h during lockdown). Possibly, TV streaming was used with digital devices other than TV sets. Similarly, about 60% of patients never used a video game console. Some of those who already played video games on a console before COVID-19 seem to have played more during lockdown, and a small percentage much more (5% vs. 1% more than 4 h, 2% vs. 1% more than 6 h, respectively). A description of media time in different psychopathological groups can be found in the supplement (Table S1).

3.2.2. Gender-specific preferences: Gaming and social media

Additionally, parents estimated the time spent on favorite digital activities. In the full group, excessive gaming (more than 6 h/day) emerged in a relatively small percentage of patients during the lockdown (7% vs. 2% before COVID-19), but a large proportion had never played video games before COVID-19 and in most cases also did not play during the lockdown (39% vs. 34%), while 5% commenced video gaming. Excessive social media activities (more than 6 h/day) were observed in 7% (vs. 2% before COVID-19), while 20% remained non-users of social media. Media use was strongly affected by gender and age (Fig. 2). Gaming was almost exclusively seen in males, with elevated (4-6 h) to excessive gaming (> 6 h) being reported in 35% of male patients of the older group during lockdown compared to 4% of the corresponding female group. An opposite, although less pronounced pattern was found with regard to social media use, with a peak of 43% of female patients aged 14 years and older spending more than 4 h a day during lockdown, in contrast to 17% of male patients of this age group.

For statistical comparison, gaming and social media time were recoded using the mean of each time range category as a numerical value (i.e. ½ h, 2 h, 5 h, and 7 h; the latter as a conservative estimate for the category >6 h), and changes across time were calculated for male and female patients. Based on these estimates, the overall increase in gaming time from pre-COVID-19 to lockdown was 66.8% for the full group. For social media, the overall increase from pre-COVID-19 to lockdown was 45.3%.

In a repeated measures analysis of gaming time, the main effect for gaming across time (T1: before COVID-19, T2: during lockdown, T3: last two weeks) and the interaction of gaming by gender were significant (time: $F = 56.877$, $p < .001$; interaction $F = 23.570$, $p < .001$) (Supplement, Table S2). Furthermore, this interaction was significant for all

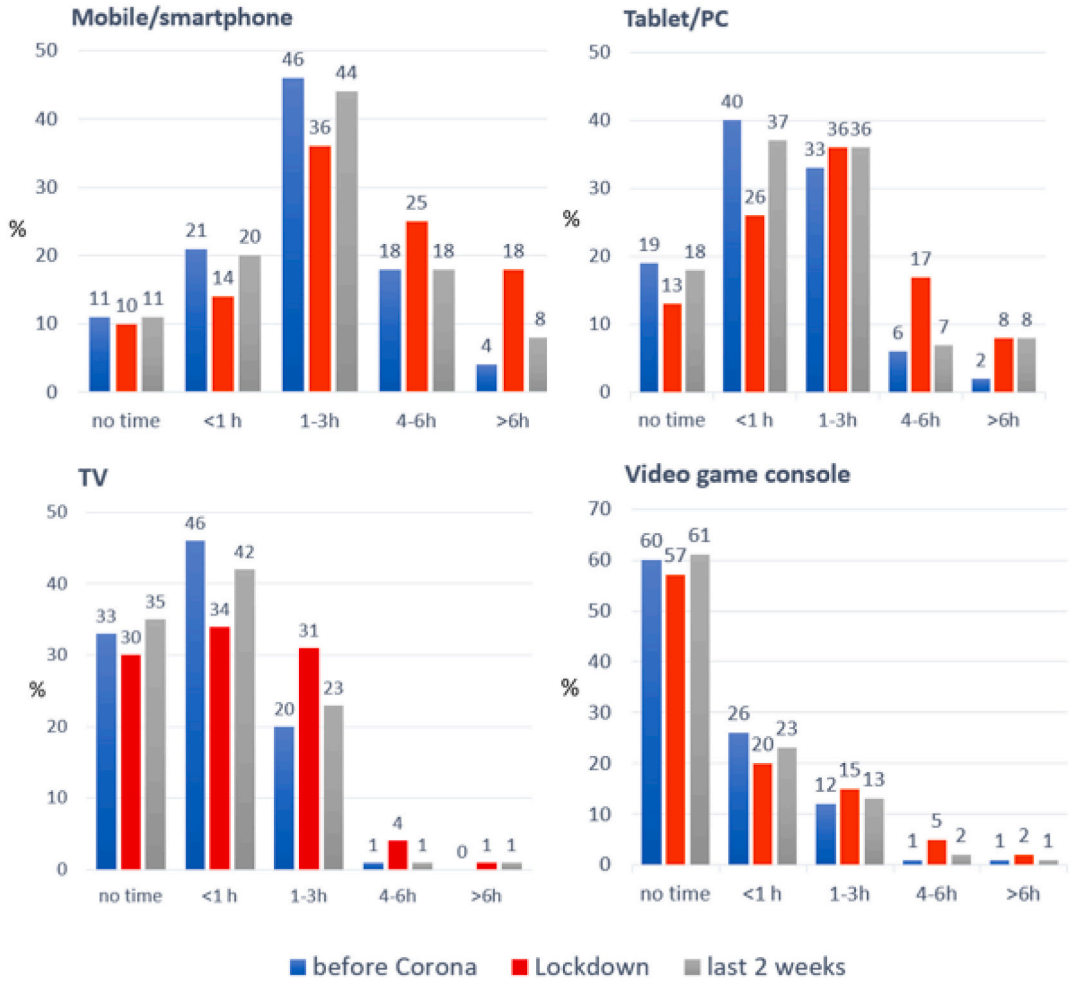

Fig. 1. Time (hours) on different screen media at three time points: before COVID-19 crisis, during lockdown and during the last two weeks. Numbers above columns indicate percent of responses; each time point = 100% (N 477).

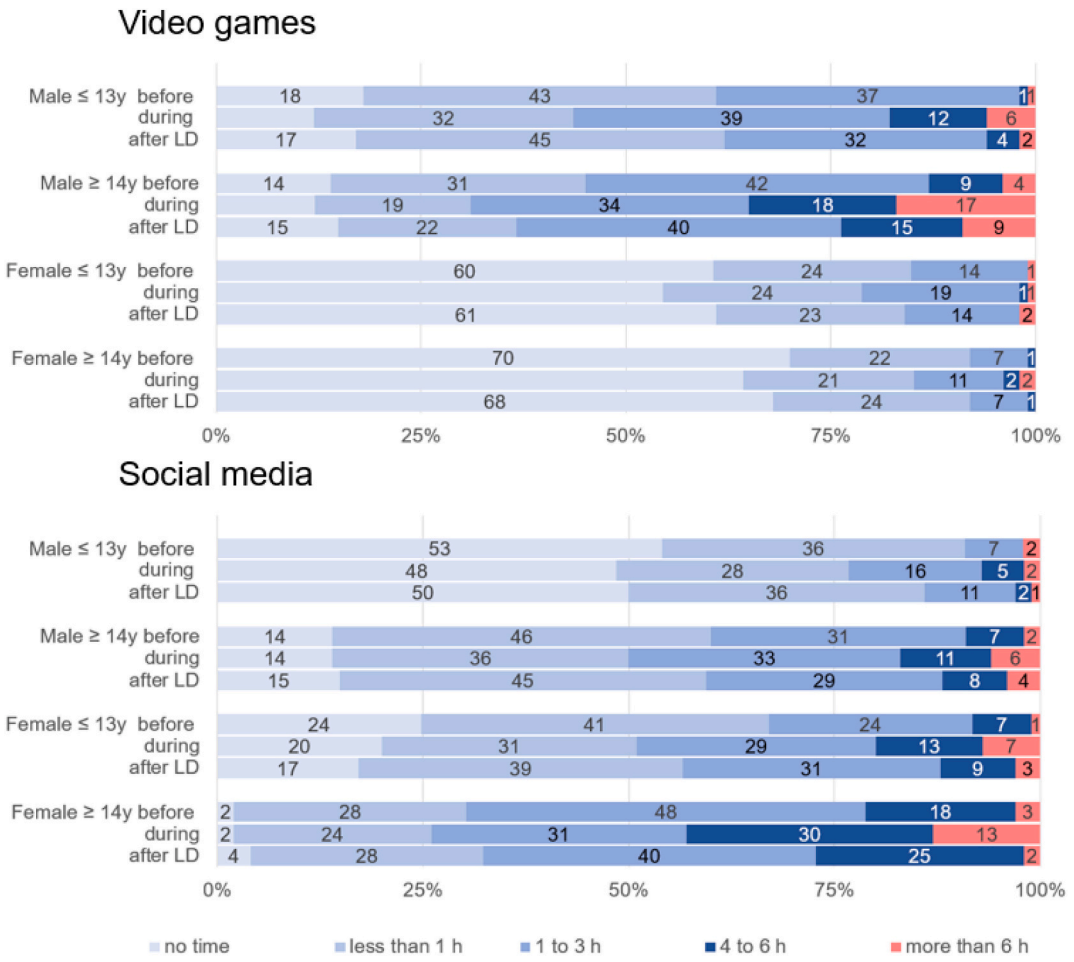

Fig. 2. Time spent on social media and video games in younger and older male and female patients according to parents' ratings: before COVID-19, during lockdown (during LD) and last 2 two weeks (after LD). Numbers in bars represent percent of responses. (Male ≤13 years $N = 116$, Female≤13 years $N = 70$, Male ≥14 years $N = 138$, Female≥14 years, $N = 130$); Transgender patients were omitted due to the small sample size.

time-related contrasts, indicating that changes in gaming time were more elevated in male than in female patients. Pairwise comparison indicated that after lockdown, gaming time returned to pre-COVID-19 levels in female but not in male patients (Fig. 3A, Supplement Table S2).

In the repeated measures analysis of estimated social media time across time, a significant main effect of time ($F = 63.239$, $p < .001$) and a significant time by gender interaction ($F = 6.077$, $p < .003$) emerged (Fig. 3B, Supplement Table S2). Planned contrasts revealed significant differences in social media time from T1 to T2 and T1 to T3, indicating an increase in social media time during lockdown in both male and female patients, and a difference between pre-COVID-19 (T1) and after lockdown (T3) levels. Time by gender interaction contrasts were significant for T1 to T2 and T2 to T3 differences, indicating a steeper increase and subsequent decrease in female patients, but were not significant for T1 to T3 differences. Pairwise comparisons revealed significant differences between social media time from T1 to T3 in girls ($p = .038$) but not in boys ($p = .140$) (Supplement, Table S1, Fig. 3B). However, this latter finding did not withstand Bonferroni correction. Thus, in contrast to gaming time in male patients, it should be concluded that social media time in male and female patients returned to pre-COVID-19 levels after the lockdown.

3.2.3. Total media time

To estimate the total time on media devices, including TV and game consoles, times were added up by using the mean of each time range (i.e. ½ h, 2 h, 5 h, and 7 h, the latter as a conservative estimate for the category >6 h). Total media time increased by 40.5% during lockdown in male patients (from 4.47 h to 7.51 h) and by 33% in female patients (from 4.77 h to 7.12 h) (Fig. 3 C, Supplement Table S2).

The repeated measures ANOVA revealed a significant main effect of time ($F = 200.375$, $p < .001$) as well as an interaction of time by gender ($F = 3.211$, $p = .044$) (Supplement, Table S2). Total media time during the lockdown was significantly higher than before and after the lockdown. The interaction was significant for the contrast between pre-COVID-19 and last two weeks total media time. Pairwise comparison showed that in female patients, total media time of the last two weeks had returned to the pre-COVID-19 level, while in male patients, total media time of the last two weeks was significantly higher than before COVID-19 (Fig. 3C; Supplement Table S2). In general, total media time was significantly more elevated in older than in younger patients, but changes over time were the same for the two age groups.

3.3. Analyses of other PUI-SQ subscales

3.3.1. Parents' concerns about their child's media time

When asked about their concerns regarding their child's media use, before COVID-19, more than a third of parents (38.2%) indicated being quite or very concerned about smartphone use, followed by concern about time on the internet (32.1%), social media (24.8%) and gaming (22.5), while only 12.5% indicated concern about watching TV (Table 2). These concerns increased considerably during lockdown with regard to internet use (36.7%), smartphone use (29.8%), gaming (25.4%), social media (21.5%), and TV (15.3%).

The statistical analysis of the media time concern subscale score

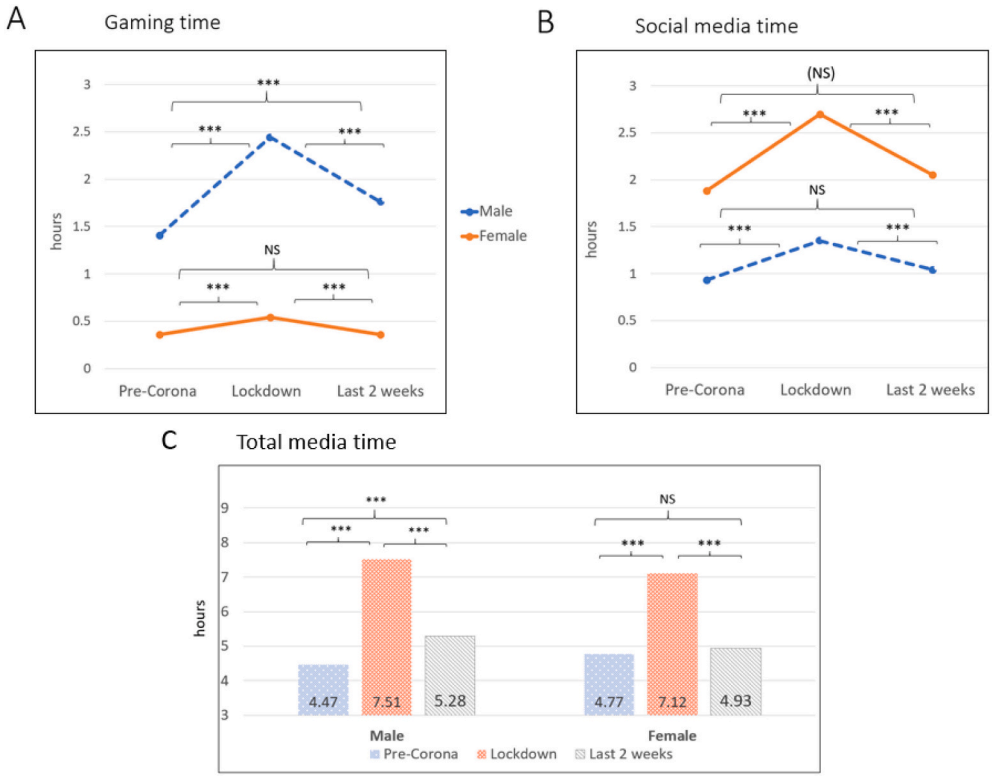

Fig. 3. A) Gaming time, B) Social media time, C) Estimated total media time in male and female patients before COVID-19, during lockdown and last two weeks. Male patients did not return to pre-COVID-19 gaming time and pre-COVID-19 total media time after lockdown. *** $p < .001$; NS = non-significant, (NS) = non-significant after Bonferroni correction.

Table 2
Parents' concerns about amount of media time and changes during and after lockdown (% responses).

I am concerned that my child spends a lot of time …	Before COVID-19 (T1)				Lockdown (T2) (compared to T1)		Last 2 weeks (T3) (compared to T2)	
	Not true	Slight-ly true	Quite true	Abso-lutely true	More concerned	Less concerned	More concerned	Less concerned
…. on his/ her smartphone	24.7	37.1	30.0	8.2	29.8	6.9	5.2	22.9
... on the internet	21.2	46.8	25.2	6.9	36.7	6.1	4.4	27.9
… playing videogames	47.8	29.8	17.0	5.5	25.4	4.6	3.6	18.7
… on social networks	42.3	32.3	18.9	5.9	21.5	5.5	2.9	15.3
... watching TV	73.2	21.6	4.4	0.8	15.3	1.9	11.1	0.8

across the three time points resulted in a significant main effect for subscale score changes over time ($p < .001$), while interactions of time by gender ($p = .070$) and time by gender by age ($p = .077$) were only significant by trend (Supplement, Table S2). Interpreting these trends suggests that parents' concerns did not entirely return to normal pre-COVID-19 levels in younger girls and older boys. In general, parents' concerns were lower for younger than for older patients (Supplement, Table S3).

Table 3
Negative impact of digital media use on everyday life and addiction-like behavior.

	Before COVID-19 (T1)				Lockdown (T2) compared to T1		Last 2 weeks (T3) compared to T2	
Negative impact of child's media use on…	Not true	Slightly true	Quite true	Abso-lutely true	Worse	Better	Better	Worse
…family life	24%	46%	24%	6%	24.1%	8.2%	19%	6%
….homework and academic achievements	42%	36%	18%	4%	25.4%	8.4%	17%	7%
…friendships and social activities in real life	45%	35%	12%	8%	21%	7.5%	16%	9%
….mental well-being and mental health (e.g. mood)	37%	40%	17%	6%	21.2%	9.4%	15.9%	7%
…physical well-being and health (e.g. sleep)	43%	38%	15%	6%	21.6	8.0%	14.9%	6.5%
I am concerned because my child …					Concern more less		Concern more less	
…becomes aggressive/very angry when media use is restricted	27%	31%	26%	13%	18.8%	5.2%	14.9%	5%
…secretly spends more time on media than agreed upon[a]	30%	31%	11%	7%	20.8%	6.9%	14.7%	4.2%

[a] Not applicable/no agreement was made between parents and child: 7%.

3.3.2. Negative impact of media use on everyday life

When asked retrospectively about the negative impact of their child's media use on family life before the COVID-19 crisis, the majority indicated minor (46%) or no concern (24%) about a negative impact, while 30% were quite or very concerned (Table 3). During the lockdown, the negative impact of media on family life was intensified according to 24% of raters, while 8.2% indicated an improvement. In the last two weeks, this lockdown-induced negative impact seemed to have returned to previous normality for the majority of parents, as indicated by the reversed pattern of changes from lockdown to the last two weeks. This general pattern of a relative increase in concern during the lockdown in 21–24% (while approximately 5–10% of raters indicated a decrease), and a subsequent return to pre-COVID-19 levels was observed on all questions relating to the negative impact of the children's media use on everyday life (Table 3).

Problem behaviors with regard to media use were very common. Before COVID-19, 39% of parents were quite or very concerned about aggressiveness and anger shown by their child when they tried to restrict media use. The lockdown increased this concern in 18.8% (with 26% feeling quite concerned and 17.8% very concerned), while changes in the other direction were rare (5.2%). After the lockdown, the situation seemed to return to the pre-COVID-19 state for most parents, with a decrease in 15.5%, and an increase in 5.0% of cases. Before COVID-19, 18% of parents felt quite or very concerned that their child might secretly spend more time on media than agreed upon. This rate increased up to 36% during the lockdown. About 20.8% indicated a deterioration of such behavior during the lockdown. Seven percent of parents had no agreement on media time, which may be explained by the large proportion of older adolescents in our sample.

When sum scores of the negative impact subscale were statistically analyzed, it emerged that older patients and male patients generally scored higher. A moderate increase in negative impact of media use was found during the lockdown, more pronounced in male patients, which returned to pre-COVID-19 values after the lockdown (Supplement, Table S3).

3.3.3. Specific media problem- and risk-related behaviors across time

While the amount of media time and problematic reactions to media restriction may indicate problematic overuse or addiction, other problematic internet behaviors may possibly be linked to the development or maintenance of mental illness or deviant behavior, e.g. watching harmful video clips and TV series, or visiting chatrooms glorifying harmful behaviors such as self-harm, anorexia or violence (Table 4).

Before COVID-19, 70.4% of parents indicated no concern at all or only minor concern regarding one or more specific problems. 14.9% of parents indicated major concern ("quite" or "absolutely true") in one area, and 14.7% in two areas or more. More specifically (Table 4), parents most often had major concern with regard to the careless and risky handling of data (13.4%) and the watching of inappropriate films or clips (13.4%). Changes in problem behaviors and risks during and after lockdown were relatively small, with the exception of parents' concern that their children might watch harmful or age-inappropriate contents, which increased in 9.2% of cases during the lockdown (Table 4). A major concern regarding cyberbullying victimization was reported by 8.8% of parents before COVID-19, and only small changes occurred during lockdown in both directions. Even less frequent was the concern that one's child would be a cyberbullying perpetrator, reported by less than 2% of parents before COVID-19.

Repeated measures analyses of the problem behavior and risks subscale resulted in very small changes across time, most pronounced in younger boys (Supplement, Table S3). Taken together, however, the lockdown seemed to have very little effect on specific media-related problem behaviors and risks according to parents' perception.

Two examples of problem behaviors and risks categorized into different psychopathological groups indicating pre-COVID-19 behavior (T1) (Fig. 4) are presented here. The groups are of different sizes and varying age and gender distributions, which makes comparison difficult. Contrary to the literature, parents of girls with eating disorders did not indicate more problematic chatroom visits than other parents: 20% reported being slightly concerned. While most parents did not indicate any concern in this area, more than 40% of parents of patients with depression and gender identity conditions were concerned about problematic chatroom visits. It is well known that for both types of disorder, it is possible to access special websites or potentially harmful chat groups, e.g. promoting self-harm (see e.g. [43]). In patients with depression and gender identity disorder, a relatively high proportion of parents (48% and 43%) indicated at least some concern about cyberbullying (Fig. 4).

3.4. Factors associated with total media time during lockdown

Parents were asked to indicate whether the severity of the main psychopathological problem (i.e. the main reason for the clinical referral) had changed since January 2020 and during the lockdown. The majority indicted no change (41.10%, $N = 196$), while an improvement of problems was reported by 37.7% of parents ($N = 180$), and a deterioration only by 21.2% ($N = 99$). Girls seemed to show an improvement during lockdown more often than boys (41.5% of girls vs. 34% of boys), but this difference was not statistically significant ($p = .290$). Similarly, the two age groups did not differ significantly regarding changes in problem severity ($p = .609$). Statistical group comparison regarding estimated total media time in patients with deteriorated, unchanged and improved symptoms during lockdown revealed significant effects. In children (10-13 yrs) with a deterioration, total media time was significantly more elevated than in those with no change or with an improvement of the psychopathological problem. In adolescents (≥14

Table 4
Problem behaviors and risks related to the child's media use before COVID-19, during lockdown and last two weeks. (Numbers indicate percent of responses) (N 477 = 100%).

	Before COVID-19 (T1)				Lockdown (T2 compared to T1)		Last 2 weeks (T3 compared to T2)	
I am concerned that my child might…	Not true	Slight-ly true	Quite true	Abso-lutely true	Concerned more	less	Concerned more	less
….be a victim of cyberbullying	68.8	22.4	6.1	2.7	4.4	2.9	1.7	4.8
… be a cyberbullying perpetrator	88.1	10.1	1.0	0.8	1.7	1.7	0.4	1.7
... be too careless with risks on the internet (e.g. handling of personal data, pictures)	50.5	36.1	9.6	3.8	4.4	2.9	1.7	4.8
... play video games with harmful or age-inappropriate content (e.g. trivializing violence)	65.6	25.2	6.9	2.3	5.0	2.3	0.4	3.1
…visit problematic chatrooms/chat groups (e.g. promoting self-harm)	68.6	23.7	6.1	1.7	5.2	1.9	0.4	4.4
…watch films, series or clips with harmful or age-inappropriate content	44.9	41.7	10.7	2.7	9.2	2.1	0.4	5.9
... illegally download or download or distribute prohibited content	73.4	22.2	3.1	1.3	3.6	1.9	0.6	2.9

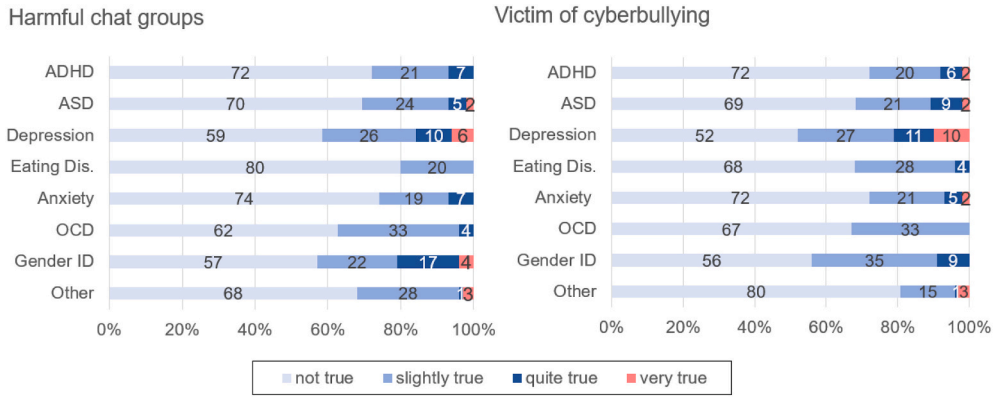

Fig. 4. Concern indicated by parents regarding media-related problem behaviors (before Corona) in different psychopathological groups. Bars signal distribution of parents' responses (percent). ADHD attention-deficit/hyperactivity disorder ($N = 131$), ASD autism spectrum disorder ($N = 67$), depression (N = 67), eating disorder ($N = 25$), anxiety ($N = 62$), OCD obsessive-compulsive disorder ($N = 24$), gender Identity condition ($N = 23$), other N = (72).

yrs), total media time was elevated in all patients, irrespective of the deterioration or improvement of problems. (Fig. 5 A, supplement Table S4).

Parents were asked whether their child had felt unhappy or happy during the lockdown. 32.5% of parents responded that their child had been unhappy or very unhappy, 35.4% happy or very happy and 32.1% neither happy nor unhappy (neutral). When happiness was related to total media time, it was apparent that patients of both age groups rated as "happy" during lockdown spent significantly less time on media than those who were rated as "unhappy" (Fig. 4B, Supplement Table S4).

It was further analyzed whether total media time was related to the number of psychopathological problems indicated by parents (i.e. one (49.5%) or two (50.5%) major psychopathological problems), to the frequency of online homeschooling during the lockdown (20.5% never, 31.4% rarely/sometimes, 46.5% frequently/always) and the frequency of leaving the home for permitted activities during the lockdown (once a week or less (37.1%), several times a week (35.8%), daily (27.1%)). None of these factors had a significant impact on total media time (Supplement, Table S4). Thus, it may be concluded that on a general level, high media consumption was not a direct result either of a lack of online homeschooling or a lack of outside activities.

4. Discussion

According to our survey, parents reported a substantial increase in their children's total media time during the spring 2020 lockdown, but also a substantial decrease after the easing of measures. Media time increase during lockdown was seen for all kinds of investigated screen media; not only mobile/smartphone, which was used by 90% of patients during lockdown, but also tablet/PC (used by 87%), TV (watched by 70%) and video game consoles (used by 43%). Interestingly, only a small proportion began to use a new screen medium for the first time during lockdown (smartphone 1%, tablet/PC 5%, TV 3%, video game console 3%) and about the same proportion of patients stopped using it again after the lockdown. In consequence, most patients increased the screen time of the media device that they had already been using before.

As is often reported in the literature, significant effects of gender and increasing media time with age were already present pre-COVID-19, with a much greater gaming time in older boys than in girls and greater social media time in girls than in boys e.g. [44] . In our clinical sample, the initial mean gaming time in male patients aged 10–18 yrs. was 1.41 h a day, which is approximately compatible with the results of a representative Swiss survey on media behavior in youth, in which adolescent boys (12–19 yrs) were reported to spend 1 h.23 min per day on gaming during weekdays and 2 h.46 min during weekend days [45].

Gaming time increased by 59.9% during lockdown, while social media time increased by 40.2%. This is less than reported in a survey conducted by a German health insurance provider in spring 2020 [46,47] in which gaming time during lockdown increased by 75% on weekdays and 29% on weekends compared to before COVID-19 in a representative sample of children and adolescents aged 10–17 years according to self-rating. The same study found that social media consumption increased by 66% on weekdays and 30.5% on the weekend.

Most importantly, we found that many effects of increased media time were only temporary, at least in girls, for whom total media time returned to pre-COVID-19 levels after the lockdown. In male patients, a

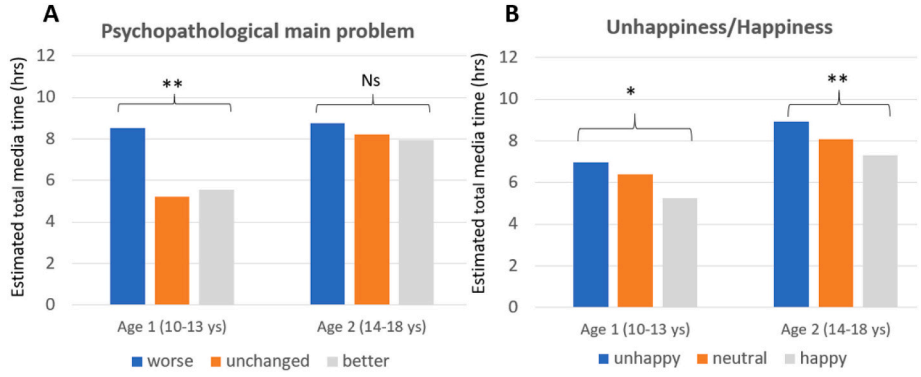

Fig. 5. Estimated mean total media time during the lockdown related to (A) the stability of the psychopathological main problem and (B) unhappiness/happiness during the lockdown in children and adolescents. A) Age 1: worse $N = 38$, unchanged $N = 73$, better $N = 75$; age 2: worse $N = 63$, unchanged $N = 123$, better $N = 123$. B) Age 1: unhappy $N = 50$, neutral $N = 53$, happy $N = 83$; age 2: unhappy $N = 105$, neutral $N = 100$, happy $N = 86$. ** $p < .01$, *$p < .05$; ns non-significant.

small but significant difference remained between pre- and post-COVID-19 gaming time, which was reflected in a significant difference in total media time. Gaming time remained excessive (>6 h a day) in 9% of male adolescents in the age range of 14 to 18 years, compared to 4% before COVID-19. In the total group, 1.7% ($N = 8$) used to play for more than 6 h a day before COVID-19, compared to 3.1% ($N = 15$) after the lockdown. All but one of these patients were male; the only girl in this group had already been an excessive gamer before COVID-19. In consequence, changed gaming habits during lockdown may have induced PUI or addictive behaviors in a small number of male patients previously at risk.

Parents reported increased concern about their child's media use and about an increased negative impact of media use on daily life and their child's wellbeing during the lockdown, which both returned to pre-COVID-19 levels after restrictions were eased. The lockdown had almost no impact on typical problem behaviors and risks associated with internet or media, such as cyberbullying or visiting problematic chat groups. We further investigated whether total media time was related to several other factors induced by the lockdown. In our sample, increased media time was associated with a deterioration of the main psychopathological symptom for which the patient had been referred to child and adolescent psychiatry, but only in the younger age group. In older patients, total media time was generally elevated and was unrelated to changes in the severity of problems. In contrast, total media time was associated with patients' happiness in both age groups, with more elevated media time in the unhappy than in the happy subgroups. No relation emerged between total media time and the frequency of online homeschooling or the time spent outside for permitted activities.

The fact that unhappier patients or patients with a worsening of symptoms showed higher media times can be interpreted in several ways: Most plausibly, for patients with higher stress and anxiety levels during the COVID-19 crisis, elevated media use functions as a coping strategy for stress relief. The higher the level of stress, anxiety or restlessness, the greater the need to distract oneself with gaming or other internet activities. Previous research has also reported a relation between depression and high internet use during the COVID-19 pandemic [48] as well as an association between stress, anxiety and high media use in girls [13]. Additionally, very high media use may be associated with unhappiness / depression risk in a non-linear dose-response manner [49]. However, it cannot be excluded that the attempt to compensate for COVID-19-related boredom and a social void with screen media activities was not satisfying for those who had nothing else left to do, or that media-related activities may have caused new stress or negative feedback for the adolescents. Some patients who were already at risk prior to lockdown may have crossed the threshold to the full psychopathological picture of PUI due to the unlimited access to screen media during lockdown.

A certain proportion of parents indicated an improvement of their children's symptoms during lockdown rather than a deterioration. For these patients, the lockdown may have provided some relief from social or academic pressure, which in turn may have alleviated psychopathological symptoms (see e.g. [29]). Moreover, the experience of the nuclear family being close together all day may have been a positive experience for some patients, with a positive impact on the severity of psychopathology.

Taken together, our initial hypothesis that changed media habits during the lockdown would lead to PUI in a sizable portion of patients was not confirmed. Obviously, the increased media use during the limited time period of the lockdown, where social contacts were otherwise impossible, had no detrimental long-term effects on media behavior in the majority of patients, except for those already at risk for PUI. Nevertheless, one has to take into account that all data on media habits before and during the lockdown are based on retrospective ratings by parents and may therefore be biased; e.g. because parents may not have remembered appropriately, may have felt anxious, depressed, or stressed during the lockdown, or may have paid more or less attention to their child's media behavior during the lockdown than they normally would have. In addition, data were collected in spring 2020, shortly after the first (and until today only) complete lockdown in Switzerland, when many participants may have felt optimistic about a possible imminent end of the pandemic.

5. Limitations

The response rate of 28% in the present survey is comparatively low, but nevertheless satisfactory for an anonymous survey without incentives. As such, this sample is not likely to represent the full socio-economic range of patients treated in our clinics, who come from diverse socio-economic backgrounds and often have insufficient German language skills. Parents who are less inclined to supervise or control their child's media activities may be underrepresented. Finally, as mentioned before, responses on pre-COVID-19 and lockdown behavior were collected retrospectively and may therefore be biased.

6. Conclusion

In a clinically referred sample of children and adolescents with psychiatric disorders, the lockdown led to a substantial increase in screen media use. While most effects seemed to be reversible, gaming time did not completely return to pre-COVID-19 levels in male patients. Nevertheless, effects of the lockdown were not all negative: Some patients experienced relief from rather than an aggravation of symptoms. We assume that the excessive use of screen media during the lockdown may have exacerbated addictive tendencies in those who had already been at risk before the COVID-19 crisis, while for the majority of patients, excessive screen media use was only temporary. This study is the first investigation of media use during the first COVID-19 lockdown and its aftermath in children and adolescents referred to child and adolescent psychiatry.

Disclosure of potential conflicts

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.comppsych.2021.152260.

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